

RHODORA, xi. 48 (1909); Fernald & Wiegand, RHODORA, xii. 140 (1910). *Pentaphyllum palustre rubrum, crassis, & villosis foliis* Pluk. Phyt. t. ccxii. f. 2 (1692). *Comarum palustre, β. villosum* Pers. Syn. ii. 58 (1807); Rydb. Mem. Dept. Bot. Columbia Univ. ii. 163 (1898) and N. A. Fl. xxii. 355 (1908). *C. tomentosum* Raf. Aut. Bot. 170 (1840).—Reported but apparently rare or of doubtful status in Sweden, Ireland, Iceland and Greenland (see notes above), and Germany and Hungary (records questioned by Wolf, Mon. Pot. 76). In North America definitely known from the following stations. QUEBEC: Alright Island, Magdalen Islands, Fernald, Long & St. John, no. 7619. NOVA SCOTIA: near Pictou, Howe & Lang, no. 478. MAINE: Princeton, Fernald & Wiegand (Fernald, no. 1920); Moose Island, Passamaquoddy Bay, Fernald & Wiegand (Fernald, no. 1921); Marshfield, Kate Furbish; Merchants' Island, Hancock Co., N. T. Kidder; Readfield, Kate Furbish. NEW YORK: Wellesley Island, Jefferson Co. (transitional form), Robinson & Maxon, no. 9; Chataqua Co., M. S. Pettit. MINNESOTA: Lake Kilpatrick, Cass Co., C. A. Ballard; Fort Snelling, E. A. Mearns. MANITOBA: Lake Winnipeg Valley, Bourgeau; Cartwright, W. Scott (acc. to Wolf). A specimen from Port Ludlow, Washington (F. Binns) strongly approaches var. *villosa* but is hardly typical.

EXPLANATION OF PLATE 106.

Fig. 1. Typical leaf of *Potentilla palustris*, after Svensk Botanik, t. 310. Fig. 2. Leaf of extreme form of *P. palustris* with narrow leaflets (*Comarum angustifolium* Raf.) from Ione, Washington (Kreager, no. 427). Fig. 3. Leaf of var. *parvifolia* from Dutch Harbor, Unalaska (Van Dyke, no. 93). Fig. 4. Leaf of var. *villosa* from Princeton, Maine (Fernald, no. 1920.)

FLORA OF THE SANDY RIVER VALLEY IN MAINE.

CLARENCE H. KNOWLTON.

THE Sandy River is a tributary of the Kennebec, in western Maine. It rises in the central part of Franklin County, with two main branches. One of these originates in a string of small ponds lying in Sandy River Plantation, and receives tributaries from Letter E and No. 6. The other branch rises in Redington, receiving many brooks from Mt. Saddleback in Madrid. The river is about fifty miles long, flowing southeast from its sources through Phillips, Avon, Strong and Farmington; then turning to the northeast it flows through New Sharon between Stark and Mercer, then through Stark into the Kennebec,

two or three miles below Madison. Some of the sources are at least 3500 feet above the sea. At its mouth it is only 190 feet above sea-level.

I have never visited the Sandy River Ponds, but I have explored several of the mountain brooks which are near the beginnings of the river. These are mostly noisy torrents and trout-brooks, full of huge rounded boulders and gravel, with only occasional specimens of *Conioselinum chinense*, *Sium cicutaefolium* and clumps of sedge (*Carex torta* and *C. lenticularis*), to differentiate their flora from that of the surrounding woods.

From Phillips to New Sharon, some thirty miles, the river is a graded stream, with numerous meanders, broad intervalles, ox-bow cut-offs and splendid terraces. These terraces are of sand and gravel above Farmington, with more clay below. Farmington village lies in part on the remnant of an old sand-plain, formed as a delta at the head of a marine estuary in the Champlain epoch, although its altitude is now 440 feet.¹ Nearly half of this sand-plain has been carried away by the river. Most of this work was probably done by the swollen stream which flowed from under the retreating glacier in the last days of the glacial period, when the ice was fast disappearing from the valley. Erosion has undoubtedly quickened greatly during the last 125 years, since the intervalles were cleared of the forest. Terraces of equal height are visible on both sides of the valley in many places, showing the original height of the glacial and post-glacial deposits. Their material is closely stratified.

In summer the river is low and has little erosive power. Its gravelly beaches are covered in many places by *Apocynum cannabinum* and *Prunus pumila*, the two most common species. *Salix cordata* and *S. lucida* form immense clumps on this gravel, their height from a few inches to several feet. In sandy places there are tufts of *Panicum tennesseense*. Where the sediment is clayey it is easy to find *Ranunculus Flammula*, var. *reptans*, *Juncus nodosus* and *J. filiformis*. Clumps of *Carex torta* are occasional.

Perhaps the most characteristic habitat of this part of the valley is the alluvial thicket, which lines the shore in many places. The American elms are everywhere here, usually scattered, but very numerous. They are also the handsomest trees of the intervalles,

¹ George H. Stone, *The Glacial Gravels of Maine and their Associated Deposits*, Monographs U. S. G. S. XXXIV, Plate II, page 484, etc. 1899.

adding a graceful beauty to the scenery. *Acer saccharinum* is abundant in the thickets, often reaching out over the river, and people call it the *river* maple. It bears the first flowers of spring, for that other harbinger of spring, the skunk cabbage, I have never found in the valley, although it flourishes along the Androscoggin, less than fifteen miles away. *Populus balsamifera* is frequent, and there are numerous willows — *Salix cordata*, *S. lucida*, *S. rostrata*, a little of *S. sericea* and near the villages, many staminate trees of *Salix alba*, var. *vitellina*. *Tilia americana* is not rare, and there are many other forest trees here and there, for when the first settlers came the intervalles were mostly covered with hardwood forest.

On the edges of these thickets are such shrubs as *Alnus incana*, *Corylus rostrata*, *Cornus stolonifera*, and more rarely, at Farmington, *C. Amomum*. *Prunus virginiana* is exceedingly common, and almost always fruits heavily. The cherries are large, and in August as they ripen, are very handsome. I have never seen them so well developed anywhere else. Among the herbaceous plants in such places may be mentioned *Lilium canadense*, *Heracleum lanatum*, *Eupatorium urticaefolium*, *Helianthus decapetalus* in great abundance, *Aster macrophyllus* var. *ianthinus*, *A. paniculatus*, *A. umbellatus* and *A. punicens*, and much less frequent, *Conioselinum chinense* and *Angelica atropurpurea*.

There is also a wonderful growth of lianes, binding everything herbaceous and frutescent into almost impenetrable masses. *Vitis vulpina*, *Psedera vitacea*, *Clematis virginiana*, *Polygonum Convolvulus*, *Apios tuberosa* and *Convolvulus sepium* are the most vigorous of these. Near Farmington there are occasional strands of *Echinocystis lobata*, evidently escaped, and two vigorous thickets of *Celastrus scandens*, which I have seen only in one other place in the region — on Day Mt., at an altitude of 1000 feet or more.¹

Inside these thickets, where the trees are taller, may be found *Laportea canadensis*, *Boehmeria cylindrica*, *Onoclea Struthiopteris* and *O. sensibilis*, *Elymus canadensis*, *Panicum clandestinum*, *Muhlenbergia foliosa*, *Bromus altissimus* and large quantities of *Veratrum viride*. Where the alluvial soil is of the finest sand, with but little humus, there are fine colonies of *Circaea intermedia*, a delicate but distinct shade plant which is well worth the finding. At Farmington I have found in these shady places *Carex cephaloidea* and *C. longirostris*, the

¹ RHODORA, VI, 208, 1904.

latter otherwise a complete stranger to the region. At Phillips I have found *Milium effusum* in woods like these, though I have elsewhere found it only in rich woods on mountain slopes.

The intervalles have all been cleared, and are in grass-land or under cultivation. Their fertility is assured by occasional spring freshets, and the first farms settled were along the river. The cultivated fields bring forth the usual introduced weeds, but in the mowing-fields there are a few vigorous native species which compete successfully with herdsgrass and red-top. One of these is *Rhus Toxicodendron*, here a prostrate vine with yellowish-green foliage, which runs out from thickets and fence-rows everywhere, making the haying season a most dangerous time for the farmer who is not immune. This is the only form of poison ivy in the region. *Asclepias syriaca*, *Equisetum arvense* and *Vicia Cracca* are also very common in the grass. *Onoclea sensibilis* is everywhere, and is so vigorous that in a few years it will drive out the "English grass," even on the upland. After haying, when the first fronds have been cut, new fronds grow which are frequently to be classified as var. *obtusilobata*. This is the first plant to feel the frost, and on the morning afterward the air is everywhere fragrant from the chilled fronds. In spring the moister places are yellow with *Barbarea vulgaris*. Sandy places bring forth *Smilacina stellata*, and at Farmington there is one good station for *Pedicularis canadensis*, which shuns the firmer soil of the upland. I have never seen it north of this place.

The ox bows and cut-offs which the river has deserted are locally called "creeks." They are full of moisture-loving species, but so many of these plants are found in wet places all over New England, that I shall mention only a few of the more interesting. *Onoclea Struthiopteris* fringes many of these creeks, and is often five feet tall. *Glyceria* is very well represented, by *G. borealis* and four other species. *Zizania aquatica* is at two places in Farmington, so near the railway as to suggest its introduction from the outside world. *Carex retrorsa* is very common, and in one place I found this summer several plants of var. *Hartii*. This variety has smaller spikes than the type, with long drooping peduncles, and spreading perigynia. Prof. Fernald assures me that this plant is new to Maine, the nearest reported station being in western New Hampshire. At Strong there is a fine station for *C. Tuckermani*, and another for *Scirpus debilis*. *S. Torreyi* and *S. pedicellatus* are occasional, while *S. atrocinctus*, *S. rubrotinctus*,

S. georgianus and *S. cyperinus*, var. *pelius* are common. In *Sagittaria latifolia* there are all possible variations. In one place the leaves vary from wide to narrow with the depth of the water. *S. arifolia* also grows in these creeks. *Sparganium diversifolium*, var. *acaule* is rather common, as well as the much larger *S. americanum*. *Cicuta bulbifera* produces one umbel of flowers, but does not ripen seed, relying on a numerous crop of bulblets instead. *Lysimachia terrestris*, however, has both seeds and bulblets in abundance. One of the prettiest color schemes I saw last summer was a dry creek-bed filled with this plant and *Mimulus ringens*, both in flower. *Steironema ciliatum* is another handsome plant, when at its best.

The dry sandy banks of the river, and the similar terraces which arise from the intervalles are paradises for *Solidago*. The handsomest kind is *S. squarrosa* which is everywhere abundant, a tall vigorous plant with a wand of large heads. *S. hispida* is a very common species in the region, while the closely related *S. bicolor* is infrequent. Other species are *S. juncea*, *S. nemoralis*, *S. serotina*, *S. canadensis*, *S. graminifolia* and a little of *S. puberula*. *Cuscuta Gronovii* is often parasitic on these goldenrods, especially near the river. *Apocynum androsaemifolium*, *Oenothera biennis* and various forms of *O. muricata*, with other coarse plants thrive in this loose water-washed till. *Apios tuberosa* and *Vitis vulpina* are also frequent in such places.

Wooded terraces have a soil full of humus, which is much richer. Here are found some of the forest trees, especially *Tilia americana*, *Acer saccharum*, *Populus grandidentata* and a very few trees of *Quercus rubra*. *Amelanchier laevis* is frequent where the terrace meets the intervalle. In spring there are handsome beds of *Sanguinaria canadensis* here, with *Erythronium americanum*, *Dentaria diphylla* and *Viola scabriuscula*. A little later come *Smilacina racemosa*, *Pyrola asarifolia* (rare) and *Osmorrhiza Claytoni*. *Amphicarpa monoica*, *Desmodium canadense* and *D. acuminatum* represent the *Leguminosae*, but the two latter I have not found above Farmington. Interesting grasses are *Hystrix patula* and *Oryzopsis racemosa*. Summer and fall flowers include *Circaea Lutetiana*, *Solidago latifolia*, *Aster cordifolius*, *A. lateriflorus*, var. *hirsuticaulis*, *A. macrophyllus*, var. *ianthinus* and *Eupatorium urticaefolium*. Even in winter the stiff stems of *Equisetum hyemale*, var. *affine* may be seen sticking up through the snow.

One day the past summer I went ten miles downstream from Farmington to New Sharon, following the stream into Somerset county,

into the towns of Mercer and Stark. I expected to find a continuation of the flora above described, but it proved to be very different. The river flows through a plain laid down in the Champlain estuary. There is a big fall at New Sharon, below which the Sandy has cut a channel through 10 to 40 feet of alluvial overwash and estuarine clays to the ground moraine, and in a few places to the metamorphic bedrock. The Sandy River thus flows in a high-walled channel over boulders, with coarse, shingly beaches. It is here about as large as the Deerfield at Hoosac Tunnel, or the White River just above its mouth.

Along the shore are several species which I have never seen up-river. There is a good deal of a low non-fruiting *Equisetum* which seems to be *E. littorale*. It is frequent on the St. John and the Penobscot, but so far as I know, has not been reported on the Kennebec. *Cyperus strigosus* appears for the first time, in limited quantity, and there is everywhere a great deal of *Rynchospora glomerata*. *Carex vulpinoidea* I had not missed up-river till I found it here. Clumps of *Deschampsia caespitosa* are very numerous. *Stellaria longifolia*, *Cicuta maculata* and *Lycopus virginicus* are also new to the region. In Stark I found a fine colony of *Habenaria flava* flourishing in wet gravel. This has been found in Chesterville, about fifteen miles from here, by Miss Eaton,¹ but I do not know of any other station for it. In the drier places above the shingle *Andropogon furcatus* crowds out all other species where it grows, and it occupies large areas of light soil above the banks. Where there is light shade I found *Danthonia compressa* in some abundance. I have found one or two specimens only of this at Farmington. Another good find was *Hypericum punctatum*. Along a tributary brook under the alders the ground was densely carpeted with *Leersia virginica*, to the exclusion of other species.

The dry woods covering the terraces and fringing the few intervalles were especially interesting. *Acer saccharinum* is infrequent and small, as it is not adapted for such dry soil. Its place is taken by *Tilia*, *Quercus rubra*, *Juglans cinerea*, *Populus tremuloides* and *Fraxinus pennsylvanica* in all sizes. *Prunus virginiana* is still abundant. Lianes were not vigorous, and much to my surprise, I found no traces of *Celastrus*. In an open place in sand I found *Trisetum spicatum*, which I had found only at Phillips, 30 miles up stream, on ledges.

¹ L. O. Eaton, RHODORA V, 82-3, 1903 (As *H. virescens* Spreng.).

There were also clumps of *Agropyron caninum*. To me, however, the best find of the day was *Phryma Leptostachya* in Mercer, where it grew in dry alluvial woods with *Circaea Lutetiana*.

As this single day below New Sharon secured me fourteen species I had never collected in the region before, I feel confident that further exploration of the lower river will bring to light many other interesting plants.

Ranunculus septentrionalis is a frequent plant on many of the New England rivers, and I am considerably at a loss as to its scarcity along the Sandy. I have found it only once by the river at Farmington. It grows in one place on a tributary at least a mile from the river, and I found it in a clayey ditch at Stark, well back from the river. It seems to be very rare. *R. repens* I have found well introduced at Farmington and New Sharon.

In closing, I will mention the few genuine aquatics which I have found in the river. There are quiet reaches in its lower and middle course, and in such places *Isoëtes echinospora*, var. *Braunii* is common. *Nymphaea microphylla* is occasional, and there are several species of *Potamogeton*. Of these I have identified *P. amplifolius*, *P. dimorphus*, *P. bupleuroides* and *P. epihydrus*. The water in the creeks is stagnant, and often dries up completely, so they do not furnish a desirable habitat for aquatic plants.

For the convenience of any who are interested in the region, I add the following list of RHODORA articles about Franklin County plants.

EATON, LILLIAN O.: Orchids of Chesterville, V, 82, 1903; Plants of Chesterville, IX, 207, 1907; Plants of Chesterville, XI, 30, 1909.

JEWELL, H. W.: Notes on Some Ferns of Franklin County, IV, 247, 1902.

KNOWLTON, C. H.: On the Flora of Mt. Abraham Township, I, 191, 1899; On the Flora of Chesterville, II, 123, 1900; Flora of Mt. Saddleback, V, 35, 1903; On the Flora of Day Mt., VI, 206, 1904.

HINGHAM, MASSACHUSETTS.